

What is claimed is:

1. A signal processing unit which calculates the value of v^p , where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising:

an exponent part extraction section which extracts a bit series from said exponent part of said floating point data item;

a mantissa part extraction section which extracts the most significant K bits from said mantissa part of said floating point data item;

a first conversion section which inputs the output e of said exponent part extraction section and outputs the value of a function $X(e)$ thereof;

a second conversion section which inputs the output f of said mantissa part extraction section and outputs the value of a function $Y(f)$ thereof; and

a multiplier section which multiplies together the output value from said first conversion section and the output value from said second conversion section;

wherein:

when i and j are taken as integers, said function $X(i)$ is a function which returns the value:

$$X(i)=2^{((i-((1<E-1)-1)-K)*p)},$$

and said function $Y(j)$ is a function which returns the value:

$$Y(j)=((1<K)+j)^p.$$

5 2. A signal processing unit according to claim 1, wherein:

said first conversion section is constituted as a table in which, for each address i , the value of $X(i)$ is stored in advance; and

said second conversion section is constituted as a table in which, for each address j , the value of $Y(j)$ is stored in advance.

3. A signal processing unit which calculates the value of v^p , where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, and p is a constant, comprising:

an exponent part extraction section which extracts a bit series from said exponent part of said floating point data item;

20 a mantissa part extraction section which extracts the most significant K bits from said mantissa part of said floating point data item;

a first conversion section which inputs the output e of said exponent part extraction section and outputs the value of a function X(e) thereof;

5 a second conversion section which inputs the output f of said mantissa part extraction section and outputs the value of a function Y(f) thereof; and

a multiplier section which multiplies together the output value from said first conversion section and the output value from said second conversion section;

10 wherein:

when i and j are taken as integers, for some real number S, said function X(i) is a function which returns the value:

$$X(i) = 2^{((i - ((1 < E - 1) - 1) - K) * p) * S},$$

and said function Y(j) is a function which returns the value:

$$Y(j) = ((1 < K) + j)^{p/S}.$$

4. A signal processing unit according to claim 3, wherein:

20 said first conversion section is constituted as a table in which, for each address i, the value of X(i) is stored in advance;

and said second conversion section is constituted as a table in which, for each address j, the value of Y(j) is stored in advance.

5. A signal processing unit which, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculates and outputs the value of v raised to the power 1 and converted to an integer value, comprising:

an exponent and mantissa part extraction section which, when the number of bits in which $(N-2)$ is expressed in binary notation is M , extracts a bit field consisting of at least the lowermost M bits of said exponent part and at least the uppermost $(N-1)$ bits of said mantissa part; and:

a third conversion section which, when the value expressed by said bit field which has been extracted by said exponent and mantissa part extraction section is w , stores in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and which inputs the value w given by said bit field and reads out the corresponding value from said table.

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6. A signal processing method operable to calculate the value of v^p , where v is an item of floating point data made up

from an E-bit exponent part and an F-bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

5 extracting the most significant K bits from said mantissa part of said floating point data item;

inputting the output e of the exponent part extraction and outputting the value of a function $X(e)$ thereof, by storing in a table, for integer values of i, values $X(i)$ to be returned given by $2^{((i - ((1 \leq E - 1) - 1) - K) * p)}$;

inputting the output f of the mantissa part extraction and outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j, values $Y(j)$ to be returned given by $((1 \leq K) + j)^p$; and:

15 multiplying together the output values of said functions $X(e)$ and $Y(f)$.

7. A signal processing method for, where v is an item of floating point data made up from an E-bit exponent part and an F-bit mantissa part, when the value of v is greater than or
20 equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the power 1 and converted to an integer value, comprising the steps of:

when the number of bits in which (N-2) is expressed in binary notation is M, extracting a bit field consisting of at least the lowermost M bits of said exponent part and at least the uppermost (N-1) bits of said mantissa part; and:

5 when the value expressed by said bit field which has been thus extracted is w, storing in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and inputting the value w given by said bit field and reading out the corresponding value from said table.

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inputting the output f of the mantissa part extraction and outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j , values $Y(j)$ to be returned given by $((1 \leq K) + j)^p$; and:

5 multiplying together the output values of said functions $X(e)$ and $Y(f)$.

9. A computer readable medium storing instructions for performing a signal processing method for, where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the power 1 and converted to an integer value, comprising the steps of:

when the number of bits in which $(N-2)$ is expressed in binary notation is M , extracting a bit field consisting of at least the lowermost M bits of said exponent part and at least the uppermost $(N-1)$ bits of said mantissa part; and:

when the value expressed by said bit field which has been thus extracted is w , storing in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and inputting the value w given by said bit field and reading out the corresponding value from said table.

10. A program product for performing a signal processing method operable to calculate the value of v^p , where v is an item of floating point data made up from an E -bit exponent part and an F -bit mantissa part, and p is a constant, comprising the steps of:

extracting a bit series from said exponent part of said floating point data item;

extracting the most significant K bits from said mantissa part of said floating point data item;

inputting the output e of the exponent part extraction and outputting the value of a function $X(e)$ thereof, by storing in a table, for integer values of i , values $X(i)$ to be returned given by $2^{((i - ((1 < E - 1) - 1) - K) * p)}$;

inputting the output f of the mantissa part extraction and outputting the value of a function $Y(f)$ thereof, by storing in a table, for integer values of j , values $Y(j)$ to be returned given by $((1 < K) + j)^p$; and:

multiplying together the output values of said functions $X(e)$ and $Y(f)$.

11. A program product for performing a signal processing method for, where v is an item of floating point data made up

from an E-bit exponent part and an F-bit mantissa part, when the value of v is greater than or equal to 2.0 and less than 2^N , where N is a natural number, calculating and outputting the value of v raised to the power 1 and converted to an integer value, comprising the steps of:

when the number of bits in which (N-2) is expressed in binary notation is M, extracting a bit field consisting of at least the lowermost M bits of said exponent part and at least the uppermost (N-1) bits of said mantissa part; and:

when the value expressed by said bit field which has been thus extracted is w, storing in a table in advance the values of v converted into integer values in all the addresses w extracted by this bit field, and inputting the value w given by said bit field and reading out the corresponding value from said table.